## WHAT IS CLAIMED IS:

1. An isolated nucleic acid molecule comprising a nucleotide sequence that encodes a short-root protein.

S\$>

5

- 2. The isolated nucleic acid molecule of claim 1, wherein said short-root protein comprises the amino acid sequence of SEQ ID NO:2
- 3. An isolated nucleic acid molecule comprising a short-root nucleotide sequence.
  - 4. The isolated nucleic acid molecule of claim 3, wherein said short-root nucleotide sequence comprises the nucleotide sequence of SHR, shr-1, shr-2, shr-3 or shr-4.
- 5. An isolated nucleic acid molecule which hybridizes under stringent conditions to the nucleic acid molecule according to any one of claims 1 and 3, or the complement thereof.
  - 6. A recombinant vector comprising the nucleic acid molecule of 5.

- 7. An expression vector comprising the nucleic acid molecule of claim 5 operatively associated with a regulatory nucleic acid controlling the expression of the nucleic acid molecule in a host cell.
- 8. A genetically-engineered cell comprising the nucleic acid molecule of claim 5.
- 9. A genetically engineered host cell comprising the nucleic acid molecule of claim 5 operatively associated with a regulatory nucleic acid controlling the expression of the nucleic acid molecule in a host cell.
  - 10. A method for producing a SHORT-ROOT polypeptide comprising expressing a nucleic acid molecule according to claim 5 in a cell.
- 35 11. An isolated SHORT-ROOT polypeptide.

15

25

- The polypeptide of Claim 10 comprising the amino acid sequence of SEQ ID NO:2.
- 13. \ An isolated SHORT-ROOT polypeptide encoded by the nucleic acid molecule of claim 5.
  - 14. An antibody that immunospecifically binds the polypeptide of claim 12.
- 15. An anti-idiotypic antibody that mimics an epitope of a SHORT-ROOT protein.
  - 16. A plant genetically-engineered to overexpress or underexpress a SHORT-ROOT protein or polypeptide, so that cell division is modified, and root and/or stem development is altered.
  - 17. A plant genetically-engineered to overexpress a SHORT-ROOT protein or polypeptide, so that cell division is increased in roots, resulting in thicker root development.
- 18. A transgenic plant comprising a transgene having the nucleic acid molecule 20 of claim 5.
  - 19. A transgenic plant comprising a transgene having the nucleic acid molecule of claim 5 operatively associated with a regulatory nucleic acid controlling the expression of the nucleic acid molecule in a transgenic plant cell.
  - 20. The transgenic plant of Claim 17, in which the transgene encodes an antisense nucleotide sequence that suppresses expression of endogenous *SHORT-ROOT* gene product, so that cell division is decreased in roots, resulting in thinner root development.
  - 21. A genetically-engineered plant in which the endogenous *SHORT-ROOT* gene is disrupted or inactivated so that cell division is decreased in roots, resulting in thinner root development.

35

sb>

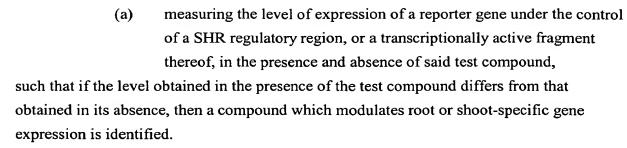
5

- 22. A transgenic plant containing a transgene encoding a gene of interest operatively associated with a *SHORT-ROOT* promoter, so that the gene of interest is expressed in a tissue-specific manner in roots or embryos.
- 23. The transgenic plant of Claim 21, in which the gene of interest encodes a gene product that confers herbicide, salt, pathogen, or insect resistance.
- 24. A transgenic plant containing a transgene encoding a gene of interest operatively associated with a SHORT-ROOT promoter, so that the gene of interest is expressed in shoots.
  - 25. The transgenic plant of Claim 23, in which the gene of interest encodes a gene product that increases starch, lignin or cellulose biosynthesis.
- A plant genetically-engineered to overexpress or underexpress the SHORT-ROOT protein so that gravitrepism of the stem or hypocotyl is altered.
  - 27. The plant of Claim 25, which is less susceptible to lodging than a wild-type plant.
  - 28. A method for identifying a compound which modulates expression of a SHORT-ROOT comprising:
    - (a) \ contacting a test compound to a cell that expresses a SHORT-ROOT;
    - (b) measuring a level of the SHORT-ROOT expression in the cell; and
- 25 (c) comparing the level of the SHORT-ROOT expression in the cell in the presence of the test compound to a level of the SHORT-ROOT expression in the cell in the absence of the test compound;

wherein, if the level of the SHORT-ROOT expression in the cell in the presence of the test compound differs from the level of expression of the SHORT-ROOT in the cell in the absence of the test compound, a compound that modulates expression of the SHORT-ROOT is identified.

29. A method for identifying a test compound capable of modulating root or shoot-specific gene expression comprising:

35



add>